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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,400	05/03/2004	Eric Chuang	VIAP0114USA	3399

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EXAMINER	
HAJNIK, DANIEL F	

ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/709,400	CHUANG, ERIC	
	Examiner	Art Unit	
	Daniel F. Hajnik	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 May 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Method for Calculating Attributes of a 3-D Graphic Utilizing a Transform and Visibility Determination.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "vertex shader", "couple of instructions", and "discriminant" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Additional Note

The specification (i.e. paragraph [0025]) and claim 2 refer to a "discriminant" and define it in terms of 2x2 matrix. However, this term does appear, upon examination, to be the correct term of art for this concept. Similar hidden surface removal techniques refer to this concept as a "determinant". In contrast, a discriminant relates to algebraic polynomial functions.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. (US Pub 2003/0067473, herein referred to as "Taylor") in view of Duluk, Jr. et al. (US Patent 5574835, herein referred to as "Duluk").

As per claim 1, Taylor teaches the claimed "calculating a triangular transform and related position attributes corresponding to a triangular primitive with a transform

program consisting of a couple of instructions among a plurality of instructions of the vertex shader" by teaching of "a programmable vertex shader engine 202" (paragraph [0015]), by teaching of "Typically, the vertex data is representative of geometric primitives (i.e. triangles)" (paragraph [0015]), by teaching of "The code data takes the form of instructions" (paragraph [0016]), by teaching of "constant state data may comprises values in transformation matrices used to rotate graphically displayed objects" (paragraph [0016]), and by teaching of "Based on the state data provided by the host, the PVS engine 202 operates upon the graphics primitives" (paragraph [0017]) (PVS=programmable vertex shader). Further, based upon how the actual instruction format is defined and based on how high or lower level of abstraction the instruction set is, one of ordinary skill in the art could achieve the transform in a couple of instructions. In this case, the examiner is interpreting "instruction" in a broader sense relating to vertex shaders and 3D graphics data. In contrast, the applicant in the specification at the end of paragraph [0007] refers to a "period" which may have a less broad or different interpretation in relation to the art.

Taylor does not explicitly teach the claimed "determining whether the triangular transform is visible according to the position attributes of the triangular transform". Duluk teaches the claimed limitation by teaching of "Rendering is a multi-step process, and one way of listing the steps is as follows: 1) transformation ... 4) back-face culling" (col 1, lines 44-51) where back-face culling removes non-visible polygons (see figure 4) and by teaching of "The z component of the cross product of these two vectors

determines the direction the polygon is facing" (col 3, lines 37-40) where these vectors are related to the polygon's position.

Taylor does not explicitly teach the claimed "calculating remaining attributes of the triangular transform if the triangular transform is visible or not calculating the remaining attributes of the triangular transform and culling the triangular transform if the triangular transform is invisible". Duluk teaches the claimed limitation by teaching of "back-face culling is the process of finding and removing backwards facing polygons" (col 3, lines 22-25) and by teaching of "At this point in the process, each polygon is already in screen coordinates, and must now be converted to a set of pixel color values ... Shading, lighting, and color of the polygon are taken into account when the color value of each rasterized polygon pixel is computed" (col 4, lines 53-55 and col 4, lines 60-62) where the color values, light, and shading are calculated using the remaining attributes.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Taylor and Duluk. One advantage to the combination is provided by Duluk, which teaches of "DCR ... detect and eliminates polygons that are hidden behind other polygons or objects. If the number of polygons that are hidden is significant, performing DCR can significantly speed up the subsequent rasterization and display steps" (col 1, lines 58-63).

As per claim 4, Taylor teaches the claimed "wherein the remaining attributes of the triangular transform are calculated with a lighting program" by teaching of "DirectX" (a lighting program) (paragraph [0006]).

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor in view of Duluk in further view of Huang et al. (US Patent 6611263, herein referred to as "Huang").

As per claim 2, Taylor does not explicitly teach the claimed limitations. Huang teaches the claimed limitations by teaching of the equation (x1 - x3)(y2 - y3) - (x2 - x3)(y1 - y3) (col 1, lines 60-63). Taking the cross product of the claimed matrix according to:

$$M = \begin{vmatrix} a & b \\ c & d \end{vmatrix} \qquad \text{Determinant } \det(M) = ad - bc$$

yields (x1 - x0)(y2 - y0) - (x2 - x0)(y1 - y0) where the equations are the same if x3, y3 is substituted for x0, y0. Further, Huang teaches of visibility defined as D > 0 (col 1, lines 40-45).

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Huang with the combinable system of Taylor and Duluk. One advantage to the combination is provided by Huang, which teaches of "The test for visibility is straightforward and is carried out in screen space. We calculate the outward normal for a polygon and examine the sign of this vector in z-axis component" (col 1,

lines 33-37) and by teaching of "If a polygon can not be seen by a viewer from a point of view, then the polygon does not have to be rendered. Thus, the performance of the render engine 14 can be improved" (col 1, lines 25-28).

As per claim 3, Taylor does not explicitly teach the claimed "whether the triangular transform is visible is determined by determining whether a normal vector of the triangular transform is pointing outward". Huang teaches the claimed limitation by teaching of "In most cases, the culling test is to calculate the outward normal of a triangle and examine the sign of the determinant for the vertices coordinates of a triangle to differentiate the visible and invisible surface from a viewpoint of a viewer" (col 1, lines 52-55).

6. Claims 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor in view of Duluk in further view of Priem (US Patent 6061066, herein referred to as "Priem").

As per claim 5, Taylor teaches the claimed "each of the three vertexes comprising at least a color attribute, and the light program is used for calculating the color attributes" by teaching of "Each triangle is defined by a set of vertices, where each vertex is described by a set of attributes. The attributes for each vertex can include spatial coordinates, texture coordinates, color data" (paragraph [0004]).

Taylor does not explicitly teach the claimed "wherein the triangular transform has three vertexes". Priem teaches the claimed limitation by teaching of "triangle 13a ... should be translated to screen space by a perspective transformation process" (col 4, lines 2-5) where the triangle 13a in figure 2 has three vertices.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Priem with the combinable system of Taylor and Duluk. One advantage to the combination is provided by Priem, which teaches of "plurality of polygons 13 allows a variegated surface to be described by relatively simple approximations of individual areas of the surface 10" (col 3, lines 53-53) where the variegated (variety of colors) surface uses attributes to quickly process and accomplish this goal.

As per claims 6 and 7, Taylor does not explicitly teach the claimed "wherein each of the vertexes comprises four color attributes" and does not explicitly teach the claimed "wherein the four color attributes are red, green, blue, and alpha attributes respectively". Priem teaches the claimed limitations by teaching of "attribute values are determined at each pixel for r, g, b colors; ... alpha;" (col 4, lines 27-31).

As per claim 8, Taylor does not explicitly teach the claimed "wherein the triangular transform has three vertexes". Priem teaches the claimed limitation by teaching of "triangle 13a ... should be translated to screen space by a perspective

transformation process" (col 4, lines 2-5) where the triangle 13a in figure 2 has three vertices.

Taylor does not explicitly teach the claimed "each of the vertexes comprising four texture attributes, and the lighting program is used for calculating the texture attributes". Priem teaches the claimed limitation by teaching of "attribute values ... two different sets of u and v texture coordinates" (col 4, lines 27-31).

As per claim 9, Taylor does not explicitly teach the claimed "wherein each of the vertexes comprises 16 attributes". Priem suggests this limitation by teaching of "In all, more than ten attributes are evaluated in the particular embodiment. Other attributes may also be evaluated in the same manner as described in this specification" (col 4, lines 29-33) where one may add 6 additional attributes to make a total of 16 attributes. One advantage is added parameters to each vertex for more realistic rendering.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor in view of Duluk in further view of Swanson (US Patent 5421028, herein referred to as "Swanson").

As per claim 10, Taylor does not explicitly teach the claimed "wherein each of the attributes of the vertexes has a data capacity of 4x32 bits". Swanson teaches the claimed limitation by teaching of "attribute data and primitives are sent through the pipeline together as data blocks. As used herein, a data block is typically a 32-bit word"

(col 6, lines 23-25). If one attribute required 4 consecutive data blocks then the attribute size would be 4x32 bits.

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Swanson with the combinable system of Taylor and Duluk. One advantage to the combination is provided by Swanson, which teaches of "data block is typically a 32-bit word" where such a standard data block size makes it easier to implement the overall system, and make it easier find other compatible parts that handle the same standard data block size for transferring and handling data in data streams.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel F. Hajnik whose telephone number is (571) 272-7642. The examiner can normally be reached on Mon-Fri (8:30A-5:00P).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka J. Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Hoang

DFH

Kee M. Tung
Primary Examiner